CCSDS
Operating Plan for Standards Development

CCSDS OPERATING PLAN FOR STANDARDS DEVELOPMENT

Issue 1

December 1999

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CONTENTS

1 PURPOSE AND SCOPE

This Operating Plan supplements the Strategic Plan of the Consultative Committee for Space Data Systems (CCSDS)[1] by providing organizational details and plans of work for the CCSDS technical panels. It also presents five strategic themes compiled by experts from within the technical panels. The themes outline areas where standardization is needed within the three CCSDS Domains for Standardization identified in the Strategic Plan. Together with the panel plans of work, the themes constitute a roadmap for future standardization activities within the CCSDS.

This Plan broadly delineates goals for the CCSDS as a whole and for its technical panels. It does not attempt to define priorities for individual CCSDS agencies; instead, it presents the larger view of overall international standardization needs based on the collective priorities of the CCSDS agencies.

2 ORGANIZATIONAL CONSIDERATIONS

2.1 Organization of CCSDS

The organization of the CCSDS is shown in figure 1. CCSDS Panel activities relate to the three CCSDS Strategic Plan space mission information system service domains as follows: Panel 1 develops technical Recommendations in the domain of Space Data Communications Services, Panel 2 in the domain of Space Information Interchange Services, and Panel 3 in the domain of Space Gateway Services.
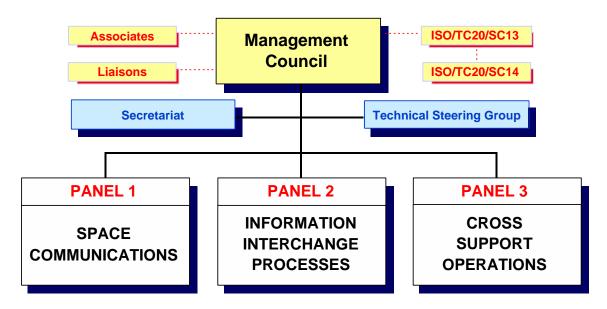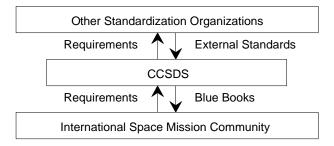

Figure 1: CCSDS Organization

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[1] *Strategic Plan of the Consultative Committee for Space Data Systems*, December 1999.

2.2   Operating Mode

CCSDS-recommended standards have been widely accepted by the international space community because CCSDS has operated in a mode that directly responded to the needs of participating-agency flight projects and mission-support infrastructures. The existing CCSDS Recommendations were developed jointly by the experts of the member agencies, with contributions from the observer agencies and industry. In some cases, a subset of the CCSDS agencies may have taken the lead in proposing concepts and producing documents, but in all cases the developmental process remained within the CCSDS community.

Because the challenges of the CCSDS Strategic Goals have grown in contrast to the shrinking resources of the CCSDS agencies, it will become necessary for the CCSDS to adopt new approaches to recommended standards development. In particular, the CCSDS recognizes the need to form strategic alliances with entities outside the CCSDS (see figure 2) and when necessary to allow one or a few individual agencies to undertake the bulk of development work on a given Recommendation.

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┌─────────────────────────────────────────────┐
│     Other Standardization Organizations      │
└─────────────────────────────────────────────┘
        Requirements  ↑ ↓  External Standards
      ┌───────────────────────────────┐
      │            CCSDS              │
      └───────────────────────────────┘
        Requirements  ↑ ↓  Blue Books
┌─────────────────────────────────────────────┐
│      International Space Mission Community    │
└─────────────────────────────────────────────┘
```

Figure 2: Development Modes

The introduction of these new approaches necessitates expansion of the CCSDS mode of operation into three basic options:

1) Based on input from the international space mission community, the CCSDS develops a recommended standard using the resources of its agencies. CCSDS reviews the recommended standard and approves it as a CCSDS Recommendation.

2) The development of the recommended standard (or part of it) is carried out through alliances with partners. Partners could be other standards organizations or commercial entities. CCSDS and partners review the recommended standard, and CCSDS approves it as a CCSDS Recommendation.

3) An existing standard covers all or part of the identified requirements. The part covering CCSDS requirements is adopted as a CCSDS Recommendation, or part of a Recommendation, after appropriate review. Any remaining requirements will be processed in one of the above two modes.

The division of responsibilities within these three modes is summarized as follows:

Mode	Generation of Requirements	Development	Review	Approval
1	CCSDS	CCSDS	CCSDS	CCSDS
2	CCSDS	CCSDS in an alliance with other entities	CCSDS and partners	CCSDS
3	CCSDS	Adopt existing standards	CCSDS	CCSDS

2.3   Standardization Process

CCSDS has been chartered by Technical Committee (TC) 20/Subcommittee (SC) 13 of the International Organization for Standardization (ISO) to develop all space mission-related ISO information technology standards.   In partnership with its sister subcommittee, ISO TC 20/SC 14, CCSDS is responsible for the development of all space mission-related data and information transfer standards.

The international space mission standardization process and relationships are shown in figure 3.
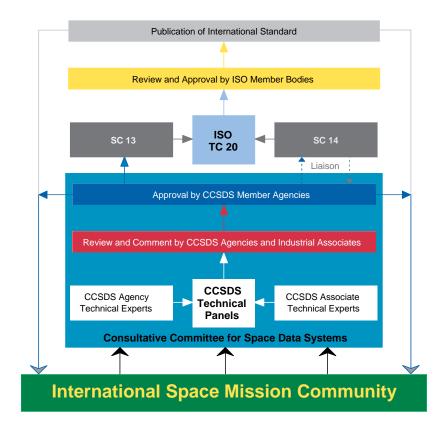
Figure 3: International Space Mission Standardization Process

3   STRATEGIC THEMES

CCSDS will develop recommendations for future space data and information transfer standards in accordance with five principal themes:

1) Highly Efficient Communications in Resource-Constrained Environments
2) Standard Data Interchange and Archiving Services
3) Standard Space Mission Operations Services
4) Space Missions as Extensions of Terrestrial Internetworks
5) Interoperable Spacecraft Onboard Interfaces
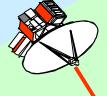
Themes 1 through 3 are existing CCSDS themes; however, their scope has been expanded. Themes 4 and 5 are new. In figure 4, the five themes and their sub-tasks are shown in graphic relation to the CCSDS Domains. Implementation details for the strategic themes are identified in the tables that follow.

In the context of CCSDS activities, theme sub-tasks are implicitly prioritized by their schedules. Because individual CCSDS agencies have priorities derived from the needs of their own programs and projects, it is expected that a given agency will allocate resources to the sub-tasks according to its own priorities.   However, overall CCSDS efforts will be focused and apportioned according to the schedules indicated for the sub-tasks.

5. Develop Interoperable Spacecraft Onboard Interfaces

"Network Ready" Space Devices and Subsystems

4. Develop Space Missions as Extensions of the Earth´s Internet

Interface with Near–Earth Constellations
Interface with Commercial Near–Earth Navigation Systems
Interface with Public Media Distribution Systems
Extension of the Internet into Near–Earth Vicinity
Extension of the Internet into Deep Space

3. Develop Standard Mission Operations Services

Space Link Access
Spacecraft Monitor and Control
Ground System Monitor and Control
Tracking and Navigation Services
Mission Planning Services
Telecommunications Services

1. Develop Highly Efficient Communications in Resource–Constrained Environments

Single Aperture/Multi-User Links
Higher Frequency Communications
Efficient Modulation
High Performance Coding
Proximity/In–Situ Communications Links
File Transfer Protocols
Security and Privacy
Advanced Data Compression
Advanced Link Layer Techniques

2. Develop Standard Data Interchange and Archiving Services

Data Management Services
Information Architecture for Space Data
Space Data Archiving Techniques

Figure 4: CCSDS Strategic Themes

Theme 1: Highly Efficient Communications in Resource-Constrained Environments

No.	Sub-Task	Elements/*Justifications*	Missions	Schedule	Imple-menter	Mode of Implemen-tation
1	Single Aperture/Multi-user RF links	– Develop specifications to allow multiple spacecraft to share a single ground antenna	Deep space uplink and downlink	Short term (Mars missions)	P1E	Mode 1
2	Higher Frequencies and Optical Communications	– Develop specifications to make more efficient use of the congested/contested lower frequency bands – *Provide increased data transmission capacity* – *Reduce tracking time to alleviate network over-subscription*	Missions using "desert ground stations" (deep space); satellite-to-satellite links	Short term for higher frequencies Long term for optical	P1E, P1A	Mode 1
3	Efficient Modulation Methods	– Develop specifications for bandwidth-efficient modulation techniques to maximize use of limited spectrum resources – Develop specifications for power-efficient modulation techniques for deep space missions, landed and roving vehicles, etc.	Potentially all missions	Short term for bandwidth-efficient modulations Medium term for power-efficient modulations	P1E	Mode 1
4	High Performance Coding	– Develop specifications to improve performance without requiring larger RF aperture/power – *Reduce tracking time to alleviate network over-subscription*	Potentially all missions	Medium term	P1E/P1A	Mode 1
5	New Proximity and In-Situ Communications and Navigation Links	– Develop specifications for proximity spacecraft-spacecraft and EVA links for constellations and fleets – Develop specifications for relay links (surface-orbiter or surface-surface) to stimulate buildup of interoperable data communications infrastructure on and around other Solar System bodies (e.g., Mars) – Develop specifications for integrated communications and positioning services	Mars missions and other missions involving relays; space stations	Short term	P1E, P1A, P1J (for the positioning)	Mode 1 and Mode 3
6	File Transfer Protocols	– Develop specifications to support autonomous spacecraft – Develop specifications to enable exchange of large quantities of key information during short-duration tracking passes – Develop specifications to enable automation of labor-intensive ground operations – Develop enhanced 'flow control' specifications to allow important data to be transferred more promptly than normal data	Potentially all missions, in particular missions with data storage capability	Short term	P1F	Mode 1 and Mode 2

Short term: less than 2 years
Medium term: between 2 and 5 years
Long term: more than 5 years

Mode 1: Developer is CCSDS
Mode 2: Alliance with outside CCSDS entity for development
Mode 3: Use of existing standards or elements of them

Theme 1: Highly Efficient Communications in Resource-Constrained Environments (continued)

No.	Sub-Task	Elements/*Justifications*	Missions	Schedule	Imple-menter	Mode of Implemen-tation
7	Security and Privacy	– Develop specifications to protect data links against unintentional intrusion (e.g. radio interference) – Develop specifications to provide end-to-end data protection against intentional intrusion – *As space missions become more internetworked, risk of malicious activity increases*	In particular, missions with audio and video communica-tions; space-station elements	Short term	P1E, P_{new}, P3, P1A, P1F; P2 particularly for security for data access and distribution	Mode 1, Mode 2 and Mode 3
8	Advanced Data Compression	– Adopt/adapt commercial file compression capabilities (such as ZIP) to extend onboard file storage capabilities – Develop new space-unique lossy compression schemes as necessary to maximize return of large quantities of information	Potentially all mission, in particular missions with on-board storage capability	Medium term	P1F (transition from P1A)	Mode 1 and Mode 3
9	Advanced Link Layer Techniques	– study/develop technologies for improved link performance, including but not limited to • variable-length adaptive modular control fields • feedback to upper layers about condition of the link (dead, congested, or corrupted) • dynamic changing of data rates on a link during a pass to improve throughput • protocols to assign priorities and handle dynamic allocation of data rates of different VCs on a link • addition of ATM as a link protocol • hailing techniques	All missions	Long term	P1A	Mode 1 and Mode 3

Short term:	less than 2 years	Mode 1:	Developer is CCSDS
Medium term:	between 2 and 5 years	Mode 2:	Alliance with outside CCSDS entity for development
Long term:	more than 5 years	Mode 3:	Use of existing standards or elements of them

Theme 2: Standard Data Interchange and Archiving Services

No.	Sub-Task	Elements/*Justifications*	Missions	Schedule	Imple-menter	Mode of Implemen-tation
1	Data Management Services	– Define services for short and medium term data repositories – Define experiment data record services – *Enable the development of standard tools for projects to manage the information they gather*	All missions, in particular science and Earth observation missions	Short/ Medium term	P2	All modes
2	Information Infrastructure Architecture for Space Data	– Develop data description techniques – Develop interoperable data dictionaries – Define registration procedures – Define interchange structures and protocols – *Enable data to be usable by the widest community of users*	All missions	Short/ Medium term	P2	All modes
3	Space Data Archiving Techniques	– Develop reference model for long-term archival systems – Develop standards for long-term preservation of information – *The information gathered by all missions must be available for future generations; archiving standards will increase the value of that information*	All missions	Short/ Medium term	P2	All modes

Short term:	less than 2 years		Mode 1:	Developer is CCSDS
Medium term:	between 2 and 5 years		Mode 2:	Alliance with outside CCSDS entity for development
Long term:	more than 5 years		Mode 3:	Use of existing standards or elements of them

Theme 3: Standard Space Mission Operations Services

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No.	Sub-Task	Elements/*Justifications*	Missions	Schedule	Imple-menter	Mode of Implemen-tation
1	Space Link Access	– Develop Model and Concept for Cross-Support Services – Develop specifications for SLE Services	All, in particular cross support missions	Short term	P3	Mode 1
2	Spacecraft Monitor and Control	– Develop spacecraft health/safety monitoring service specification – Develop performance-analysis service specification – Develop specification for using commercial/industrial automation approaches – Develop/adopt specifications for messaging systems for transmitting commands to space systems and verifying responses – Develop spacecraft time correlation service specification – Develop telecommunications link analysis service specification – Develop standard language for describing the contents of the mission data base	All missions, in particular cross support missions, e.g., Integral, Mars missions	Short term for messaging systems and automation, medium term for all other subjects	P3 for messaging systems and automation, P2 and P3 for mission data base language	Mode 3 or Mode 2 if CCSDS resources are available
3	Ground System Monitor and Control	– Specify messaging systems for transmitting commands to supporting ground network systems and verifying responses – Develop specification for using commercial/industrial automation approaches	All missions	Short term (CSOC); otherwise Medium term	P3	Mode 3 or Mode 2 if CCSDS resources are available
4	Tracking and Navigation Services	– Develop orbit determination service specification – Develop trajectory analysis service specification – Develop maneuver planning/design service specification – Define information interchange techniques for rendezvous and docking techniques	All missions	Short term	P1J, P3	Mode 3 or Mode 2 if CCSDS resources are available
5	Mission Planning Services	– Develop mission profile design service specification – Develop mission sequence design service specification	Potentially all missions	Medium term	P3	Mode 3 or Mode 2 if CCSDS resources are available
6	Telecommunications Services	– Develop ground network communications services specifications – Develop audio/video distribution service specification	Potentially all missions	Medium term	P3 (P2)	Mode 3 or Mode 2 if CCSDS resources are available

Short term:	less than 2 years		Mode 1:	Developer is CCSDS
Medium term:	between 2 and 5 years		Mode 2:	Alliance with outside CCSDS entity for development
Long term:	more than 5 years		Mode 3:	Use of existing standards or elements of them

Theme 4: Space Missions as Extensions of Terrestrial Internetworks

Date: December 1999

No.	Sub-Task	Elements/*Justifications*	Missions	Schedule	Imple-menter	Mode of Implemen-tation
1	Interface with Near-Earth Communications Constellations	– Develop specifications for low-cost and near–real time telemetry/telecommand access – *Enables potential support to Space Station and LEO Operations* – *Extend institutional communications infrastructure without requiring new investment* – Work with private sector to identify gateways between space mission and public communications systems	Potentially all LEO missions	Medium term	P1E plus P1A then P3	Modes 1 and 2
2	Interface with Near-Earth Navigation Systems (e.g. GPS, GLONASS, etc.)	– Specify low-cost spacecraft position determination service without requiring unique institutional tracking systems – Point to existing capabilities and recommend an integrated space navigation concept	Potentially all LEO missions	Short term	P1E plus P1J P3	Modes 1 and 2
3	Interface with Commercial Audio and Video Data Distribution	– Develop specifications to support easy bridging of space audio/video into public media distribution systems – *Enable low cost public "telepresence" in space exploration* – Adopt/adapt standard commercial capabilities such as MPEG, JPEG	Potentially all LEO missions, in particular manned missions	Short term	P$_{new}$ then P3; P2 for Adopt/adapt standard commercial capabilities	Modes 1 and 2; Mode 3
4	Extension of Internet into Near-Earth Vicinity	– Develop alliances with Internet standardization bodies to allow terrestrial Internet capabilities to be extended into near-Earth space – *Allow experimenters to use familiar Internet-based communications mechanisms and standard application dialogues* – *Reduce costs by using well-tested commercially available systems* – Develop space internet naming and addressing scheme in cooperation with IETF	Potentially all missions, in particular fleets of satellites	Medium term	P1F, P2, P3	Mode 2

Short term: less than 2 years
Medium term: between 2 and 5 years
Long term: more than 5 years

Mode 1:   Developer is CCSDS
Mode 2:   Alliance with outside CCSDS entity for development
Mode 3:   Use of existing standards or elements of them

Theme 4: Space Missions as Extensions of Terrestrial Internetworks (continued)

No.	Sub-Task	Elements/*Justifications*	Missions	Schedule	Imple-menter	Mode of Implemen-tation
5	Extension of Internet into Deep Space	– Develop alliances with Internet standardization bodies to allow terrestrial Internet capabilities to be utilized in deep space and on/around other Solar System bodies – Develop specifications for deploying fragments of the Earth's Internet throughout the Solar System, interconnected by gateways and long-haul communications links, to build up slowly an "Interplanetary Internet" – Develop space internet naming and addressing scheme in cooperation with IETF	Planetary orbiters and rovers	Short term	P1F, P2, P3	Mode 2

Short term:	less than 2 years	Mode 1:	Developer is CCSDS
Medium term:	between 2 and 5 years	Mode 2:	Alliance with outside CCSDS entity for development
Long term:	more than 5 years	Mode 3:	Use of existing standards or elements of them

Theme 5: Interoperable Spacecraft Onboard Interfaces

No.	Sub-Task	Elements/*Justifications*	Missions	Schedule	Imple-menter	Mode of Implemen-tation
1	"Network Ready" Space Devices and Subsystems	− Develop on-board bus/network interfaces − Develop on-board network services − Develop on-board time distribution systems	All missions, in particular missions with international participation	Medium-Long term	P_{new}	Modes 2 and 3 (Establish joint working groups with ISO/TC 20/SC 14 and industry participants)

Short term:	less than 2 years		Mode 1:	Developer is CCSDS
Medium term:	between 2 and 5 years		Mode 2:	Alliance with outside CCSDS entity for development
Long term:	more than 5 years		Mode 3:	Use of existing standards or elements of them

Annex A

CCSDS Technical Panel
Terms of Reference
and
Current Plans of Work

CCSDS Panel 1 (P1)
Space Communications

Terms of Reference

Panel 1 is responsible for the efficiency and integrity of communications between source and destination during space operations and for the identification and development of Recommendations to support those communications. It is organized by subpanels that essentially parallel the layers of the ISO Seven-layer Reference Model:

–   Subpanel 1E addresses the Physical Layer: Optical, RF, Modulation, and Coding issues in the Space environment

–   Subpanel 1A addresses the Link Layer: data structures, synchronization, message coding, and other considerations

–   Subpanel 1F addresses High Layers: networks, transport, file transfers for space data communications, and applications such as Data Compression and Time Codes

–   Subpanel 1J addresses tracking and navigation considerations as required for space operations

Panel 1 is also responsible for the identification of appropriate safeguarding techniques for user authentication and data object protection.

CCSDS PANEL 1 WORK BREAKDOWN STRUCTURE

(approval of P1 Plenary pending)

(Status 1. November 99)

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PANEL-LEVEL ACTIVITIES

Management
P100

P110: Mngmt of P1 activities
P120: P1 meetings
P130: Mngmt of P1 contributions
     to TSG and MC

System Activities
P200

P210: CCSDS Architecture/
     Space Data System Model

Management of new Work Items
P300

P310: Prep. activ. f. advanced
     telem&telecom. systems
P320: Pass Management
P330: Data Protection
P340: Spacecraft ID
P350: Restructuring of P1 Docs

Sub-Panels 1A/1E Interface
P400

Management of Conformance Assessment
P500

Management of Compatibil./ Interop. Tests
P600

Other Tasks
A700

A710: Option Matrices/Conformance Proformas
A720: Compatibility & interoperability tests

SUB-PANEL A ACTIVITIES

Management
A100

A110: Mngmt of S-P activ.
A120: S-P 1A meetings
A130: Mngmt o. S-P contrib.
     to P1 & other CCSDS meetings

Telemetry
A200

A210: Services Blue Book
A220: New Green Book
A230: Packet Telem. BB
A240: Data Compression
A250: Sub-Packets & Packet Utilis.

Channel Coding
A300

A310: Channel Coding BB
A320: New Channel Coding GB

Telecommand
A400

A410: New Green Book
A420: Revision of exist. BBs

Advanced Telem. & Telecommand Systems
A500

A510: Support of WP P310
A520: Interim Link Layer Aspects
A530: New Generation Link Layer
A540: Optical Comm. Protocols
A550: Secure Systems

Restructuring of Space Communication Recommendations
A600

A610: Support of WP P350
A620: Rewrite P1 Recommendations

SUB-PANEL E ACTIVITIES

Management
E100

E110: Mngmt of S-P activ.
E120: S-P 1E meetings
E130: Mngmt o. S-P contrib.
     to P1 & other CCSDS meetings

Policy Subjects
E200

E210: Higher Frequency recomm. developmt
E220: Data Relay satellites
E230: Lunar missions communications policy
E240: Orbiter-lander communications
     standardization

Technical Subjects
E300

E310: Bandwidth efficient communications
E320: Interference mitigation techniques
E330: Design tools (software & algorithms)
E340: Earth-to-space link upgrades
E350: Low cost missions
E360: Proximity and EVA links
E370: Ka-band link design for deep space
E380: Lunar/planetary mission coms systems
E390: Optical communications

Coding
E400

E410: Support of WP P400
E420: Enhanced codes
E430: Revision of Coding BB
E440: Devlpmt of GB

Other Tasks
E500

E510: Support of WP P400
E520: Review exist. BB/GB recommendations
E530: Complete BB with respect to capatibility areas
E540: Accomplishment of conformance assessment
E550: Accomplishment of compatibility/interoperability test

SUB-PANEL F ACTIVITIES

Management
F100

F110: Mngmt of S-P activ.
F120: S-P 1F meetings
F130: Mngmt o. S-P contrib. to P1
     & other CCSDS meetings

Advanced Telem. & Telecommand Systems
F200

F210: Support of WP P310 & 350
F220: Following of SCPS
     Development
F230: CFDP development

Time Aspects
F300

A310: Revision of Blue Book
A320: On-board Data/Time interface
A330: Time Correlation

Maintenance of Books
F400

F410: AOS Books
F420: SCPS Books
F430: CFDP Books

Other Tasks
F500

F510: Option Matrices/Conformance
     Proformas
F520: Compatibility/interop tests

SUB-PANEL J ACTIVITIES

Management
J100

J110: Mngmt of S-P activ.
J120: S-P 1J meetings
J130: Mngmt o. S-P contrib. to P1
     & other CCSDS meetings

Update of existing BB
J200

WP210: Develop White Book
WP220: Publish revised BB

New Recommendations
J300

WP310: Investigate areas where
      new standards are needed
WP320: Assess impact on agen-
      cies for implementation of
      navigation standards
WP330: Propose concepts for
      technical papers

CCSDS Panel 2 (P2)
Information Interchange Processes (IIP)

Terms of Reference

Panel 2 has the major role of integrating recently acquired space data into the global information infrastructure so that they are readily and permanently accessible by interested users. As such, its concern is the functionality of information interchange, as opposed to other CCSDS panels' concerns of real-time transporting and handling of space mission-related data. Recognizing the problems associated with the interchange of space mission-related information among autonomous, distributed, and heterogeneous systems having wide variations in time between generation and application of that information, Panel 2's program is organized for identifying and developing standards for:

Data Location	-	Determining whether and where certain data exist
Data Archiving	-	Successfully storing data and their descriptions
Data Access	-	Finding and retrieving old data when requested
Data Understanding	-	Obtaining syntactic and semantic information about the archived data and methods for registering data descriptions
Data transfer	-	Agreeing on common application data formats and other products/data objects for multi-discipline earth and science information interchange activities
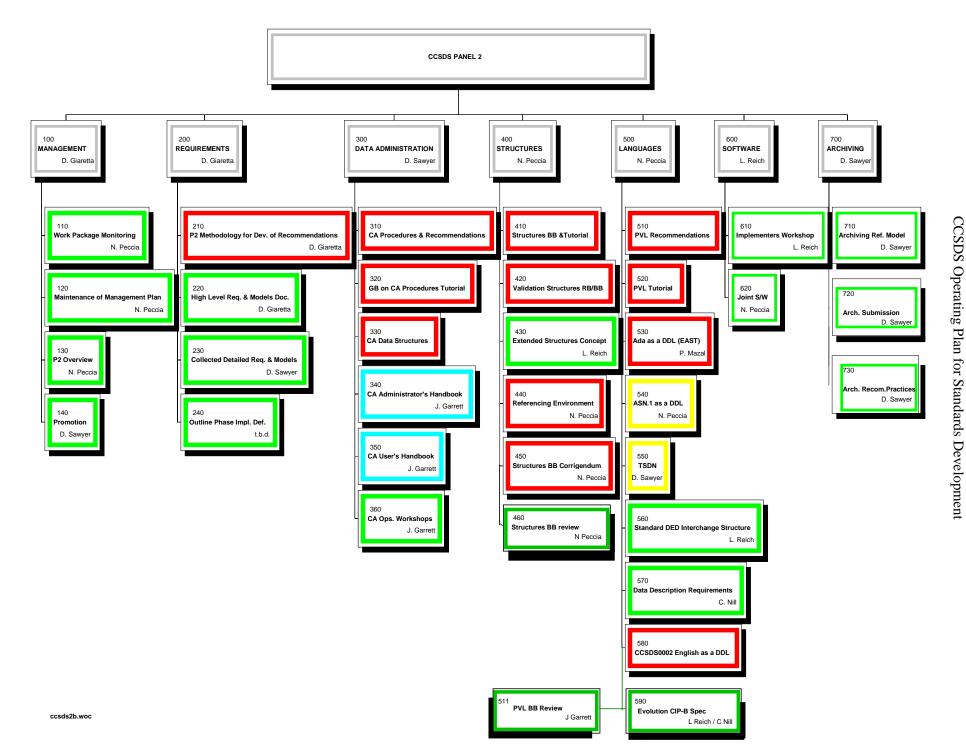
Panel 2 is also responsible for the identification of appropriate safeguarding techniques for user authentication and data object protection.

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CCSDS PANEL 2

100 **MANAGEMENT** D. Giaretta	200 **REQUIREMENTS** D. Giaretta	300 **DATA ADMINISTRATION** D. Sawyer	400 **STRUCTURES** N. Peccia	500 **LANGUAGES** N. Peccia	600 **SOFTWARE** L. Reich	700 **ARCHIVING** D. Sawyer

100 MANAGEMENT

- 110 **Work Package Monitoring** — N. Peccia
- 120 **Maintenance of Management Plan** — N. Peccia
- 130 **P2 Overview** — N. Peccia
- 140 **Promotion** — D. Sawyer

200 REQUIREMENTS

- 210 **P2 Methodology for Dev. of Recommendations** — D. Giaretta
- 220 **High Level Req. & Models Doc.** — D. Giaretta
- 230 **Collected Detailed Req. & Models** — D. Sawyer
- 240 **Outline Phase Impl. Def.** — t.b.d.

300 DATA ADMINISTRATION

- 310 **CA Procedures & Recommendations**
- 320 **GB on CA Procedures Tutorial**
- 330 **CA Data Structures**
- 340 **CA Administrator's Handbook** — J. Garrett
- 350 **CA User's Handbook** — J. Garrett
- 360 **CA Ops. Workshops** — J. Garrett

400 STRUCTURES

- 410 **Structures BB &Tutorial**
- 420 **Validation Structures RB/BB**
- 430 **Extended Structures Concept** — L. Reich
- 440 **Referencing Environment** — N. Peccia
- 450 **Structures BB Corrigendum** — N. Peccia
- 460 **Structures BB review** — N Peccia

500 LANGUAGES

- 510 **PVL Recommendations**
- 520 **PVL Tutorial**
- 530 **Ada as a DDL (EAST)** — P. Mazal
- 540 **ASN.1 as a DDL** — N. Peccia
- 550 **TSDN** — D. Sawyer
- 560 **Standard DED Interchange Structure** — L. Reich
- 570 **Data Description Requirements** — C. Nill
- 580 **CCSDS0002 English as a DDL**
- 590 **Evolution CIP-B Spec** — L Reich / C Nill
- 511 **PVL BB Review** — J Garrett

600 SOFTWARE

- 610 **Implementers Workshop** — L. Reich
- 620 **Joint S/W** — N. Peccia

700 ARCHIVING

- 710 **Archiving Ref. Model** — D. Sawyer
- 720 **Arch. Submission** — D. Sawyer
- 730 **Arch. Recom.Practices** — D. Sawyer

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CCSDS Panel 3 (P3)
Cross Support Operations

Terms of Reference

Panel 3 addresses the functionality of extending forward and return communications between the ground-based users and the ground gateway of the space link, hence the term Space Link Extension (SLE).

Additionally, since the ground gateway user interface is that part of the end-to-end data system in which the majority of cross-support operations between the user and the provider agencies occur, Panel 3 is responsible for the identification and definition of the ground cross support services as well as for the development of Recommendations defining services, related procedures, formats, and protocols for all phases of operational cross support.

Panel 3 is also responsible for the identification of appropriate safeguarding techniques for user authentication and data object protection.
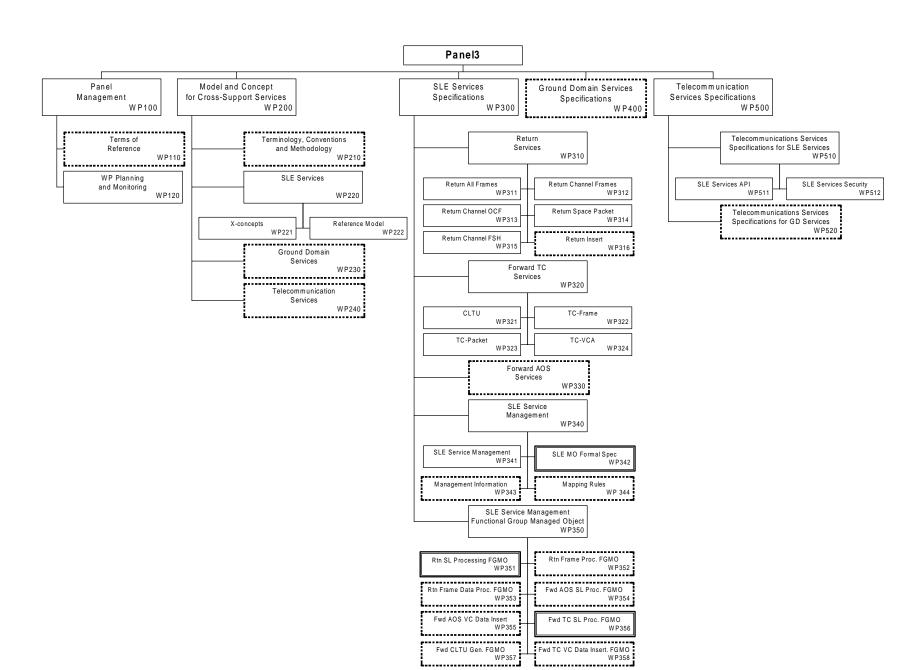
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Panel3

Panel Management WP100	Model and Concept for Cross-Support Services WP200	SLE Services Specifications WP300	Ground Domain Services Specifications WP400	Telecommunication Services Specifications WP500

Panel Management WP100:
- Terms of Reference WP110
- WP Planning and Monitoring WP120

Model and Concept for Cross-Support Services WP200:
- Terminology, Conventions and Methodology WP210
- SLE Services WP220
  - X-concepts WP221
  - Reference Model WP222
- Ground Domain Services WP230
- Telecommunication Services WP240

SLE Services Specifications WP300:

Return Services WP310
- Return All Frames WP311
- Return Channel Frames WP312
- Return Channel OCF WP313
- Return Space Packet WP314
- Return Channel FSH WP315
- Return Insert WP316

Forward TC Services WP320
- CLTU WP321
- TC-Frame WP322
- TC-Packet WP323
- TC-VCA WP324

Forward AOS Services WP330

SLE Service Management WP340
- SLE Service Management WP341
- SLE MO Formal Spec WP342
- Management Information WP343
- Mapping Rules WP 344

SLE Service Management Functional Group Managed Object WP350
- Rtn SL Processing FGMO WP351
- Rtn Frame Proc. FGMO WP352
- Rtn Frame Data Proc. FGMO WP353
- Fwd AOS SL Proc. FGMO WP354
- Fwd AOS VC Data Insert WP355
- Fwd TC SL Proc. FGMO WP356
- Fwd CLTU Gen. FGMO WP357
- Fwd TC VC Data Insert. FGMO WP358

Telecommunication Services Specifications WP500:
- Telecommunications Services Specifications for SLE Services WP510
  - SLE Services API WP511
  - SLE Services Security WP512
- Telecommunications Services Specifications for GD Services WP520

Annex B

CCSDS Publications[1]

CCSDS 100.0-G-1.   *Telemetry Summary of Concept and Rationale.* Green Book. December 1987.
CCSDS 101.0-B-4.   *Telemetry Channel Coding.* Blue Book. May 1999.
CCSDS 102.0-B-4.   *Packet Telemetry.* Blue Book. November 1995. (ISO 13419:1997.)
CCSDS 103.0-B-1.   *Packet Telemetry Services.* Blue Book. May 1996. (ISO/DIS 17433.)
CCSDS 120.0-G-1.   *Lossless Data Compression.* Green Book. May 1997.
CCSDS 121.0-B-1.   *Lossless Data Compression.* Blue Book. May 1997. (ISO/DIS 15877.)
CCSDS 200.0-G-6.   *Telecommand Summary of Concept and Rationale.* Green Book. January 1987.
CCSDS 201.0-B-2.   *Telecommand Part 1—Channel Service.* Blue Book. November 1995. (ISO 12171:1998.)
CCSDS 202.0-B-2.   *Telecommand Part 2—Data Routing Service.* Blue Book. November 1992. (ISO 12172:1998.)
CCSDS 202.1-B-1.   *Telecommand Part 2.1—Command Operation Procedures.* Blue Book. October 1991. (ISO 12173:1998.)
CCSDS 203.0-B-1.   *Telecommand Part 3—Data Management Service.* Blue Book. January 1987. (ISO 12174:1998.)
CCSDS 301.0-B-2.   *Time Code Formats.* Blue Book. April 1990. (ISO 11104:1991.)
CCSDS 320.0-B-2.   *CCSDS Global Spacecraft Identification Field Code Assignment Control Procedures.* Blue Book. October 1998.
CCSDS 401.0-B.   *Radio Frequency and Modulation Systems—Part 1: Earth Stations and Spacecraft.* Blue Book. May 1999.
CCSDS 411.0-G-3.   *Radio Frequency and Modulation—Part 1: Earth Stations.* Green Book. May 1997.
CCSDS 412.0-G-1.   *Radio Frequency and Modulation Systems—Spacecraft-Earth Station Compatibility Test Procedures.* Green Book. May 1992.
CCSDS 501.0-B-1.   *Radio Metric and Orbit Data.* Blue Book. January 1987. (ISO 11103:1991.)
CCSDS 610.0-G-5.   *Space Data Systems Operations with Standard Formatted Data Units: System and Implementation Aspects.* Green Book. February 1987.
CCSDS 620.0-B-2.   *Standard Formatted Data Units—Structure and Construction Rules.* Blue Book. May 1992. (ISO 12175:1994.)
CCSDS 621.0-G-1.   *Standard Formatted Data Units—A Tutorial.* Green Book. May 1992.
CCSDS 622.0-B-1.   *Standard Formatted Data Units—Referencing Environment.* Blue Book. May 1997. (ISO/DIS 15888.)

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[1] The documents included in this list are current as of the date of this Plan. The most recent versions of CCSDS documents can be found at http://www.ccsds.org/.

CCSDS 630.0-B-1. *Standard Formatted Data Units—Control Authority Procedures*. Blue Book. June 1993. (ISO 13764:1996.)

CCSDS 631.0-G-2. *Standard Formatted Data Units—Control Authority Procedures Tutorial*. Green Book. November 1994.

CCSDS 632.0-B-1. *Standard Formatted Data Units—Control Authority Data Structures*. Blue Book. November 1994. (ISO 15395:1998.)

CCSDS 641.0-B-1. *Parameter Value Language Specification (CCSD0006)*. Blue Book. May 1992. (ISO 14961:1997.)

CCSDS 641.0-G-1. *Parameter Value Language—A Tutorial*. Green Book. May 1992.

CCSDS 642.1-G-1. *Language Usage in Information Interchange Tutorial*. Green Book. October 1989.

CCSDS 643.0-B-1. *ASCII Encoded English (CCSD0002)*. Blue Book. November 1992. (ISO 14962:1997.)

CCSDS 644.0-B-1. *The Data Description Language EAST Specification (CCSD0010)*. Blue Book. May 1997. (ISO/DIS 15889.)

CCSDS 645.0-G-1. *The Data Description Language EAST—A Tutorial*. Green Book. May 1997.

CCSDS 646.0-G-1. *The Data Description Language EAST—List of Conventions*. Green Book. May 1997.

CCSDS 700.0-G-3. *Advanced Orbiting Systems, Networks and Data Links: Summary of Concept, Rationale and Performance*. Green Book. November 1992.

CCSDS 701.0-B-2. *Advanced Orbiting Systems, Networks and Data Links: Architectural Specification*. Blue Book. November 1992. (ISO 133420:1997.)

CCSDS 704.0-B-1. *Advanced Orbiting Systems, Networks and Data Links: Audio, Video and Still-Image Communications Services*. Blue Book. May 1994. (ISO/DIS 15890.)

CCSDS 704.1-G-3. *Advanced Orbiting Systems, Networks and Data Links: Audio, Video and Still-Image Communications Services*. Green Book. May 1994.

CCSDS 713.0-B-1. *Space Communications Protocol Specification (SCPS)—Network Protocol (SCPS-NP)*. Blue Book. May 1999. (ISO/DIS 15891.)

CCSDS 713.5-B-1. *Space Communications Protocol Specification (SCPS)—Security Protocol (SCPS-SP)*. Blue Book. May 1999. (ISO/DIS 15892.)

CCSDS 714.0-B-1. *Space Communications Protocol Specification (SCPS)—Transport Protocol (SCPS-TP)*. Blue Book. May 1999. (ISO/DIS 15893.)

CCSDS 717.0-B-1. *Space Communications Protocol Specification (SCPS)—File Protocol (SCPS-FP)*. Blue Book. May 1999. (ISO/DIS 15894.)

CCSDS 910.2-G-1. *Standard Terminology, Conventions, and Methodology (TCM) for Defining Data Services*. Green Book. November 1994.

CCSDS 910.3-G-1. *Cross Support Concept—Part 1: Space Link Extension Services*. Green Book. May 1995.

CCSDS 910.4-B-1. *Cross Support Reference Model—Part 1: Space Link Extension Services*. Blue Book. May 1996. (ISO 15396:1998.)

CCSDS A12.0-G-1. *CCSDS-Related Implementations*. Green Book. November 1996.

CCSDS A30.0-G-3. *CCSDS Glossary*. Green Book. July 1997.